

Bachelor Thesis Review

Faculty of Mathematics and Physics, Charles University

Thesis author Ilia Zavidnyi
Thesis title Transformer Architectures for Multi-Channel Data
Year submitted 2024
Study program Computer Science
Specialization Computer Science with specialisation in Artificial Intelligence

Review author Peter Polák Reviewer
Department Institute of Formal and Applied Linguistics

Overall good OK poor insufficient

Assignment difficulty	X			
Assignment fulfilled		X		
Total size <small>... text and code, overall workload</small>		X	X	
<p>The thesis focuses on a multi-channel Transformer architecture. While the implementation of a standard (i.e., single-channel) Transformer is widely available, the student had to provide his implementation of the multi-channel Transformer. This required a good understanding of Transformer architecture, which I consider rather difficult for a bachelor's student. Hence, I think the difficulty of the bachelor thesis assignment is above average.</p> <p>The thesis consists of 20 pages of the main content (from the introduction to the conclusion), including many figures and two experiments.</p> <p>The work picked the Medical Information Mart for Intensive Care (MIMIC-IV) dataset [Johnson et al., 2020] for the experiments and focused on two subtasks: in-hospital mortality and prediction of length of stay. The work specifically motivates the selection of the length of stay prediction, as Harutyunyan et al. [2019] report that all their models performed suboptimally on MIMIC-III. However, the thesis does not compare these results. Furthermore, the results in terms of kappa for predicting the length of stay reported by Harutyunyan et al. [2019] are almost twice as good.</p> <p>Questions:</p> <ul style="list-style-type: none">• Is this significant difference in kappa due to different datasets used (i.e., MIMIC-III MIMIC-IV)?• Why did you decide to use MIMIC-IV instead of MIMIC-III (used by Harutyunyan et al. [2019])? <p>As mentioned above, the increased difficulty of the thesis outweighs all the shortcomings.</p> <p>References: Harutyunyan, et al. Multitask learning and benchmarking with clinical time series data. Scientific Data, 6(1):96, 2019. URL https://doi.org/10.1038/s41597-019-0103-9.</p>				

Thesis Text good OK poor insufficient

Form <small>... language, typography, references</small>		X	X	
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Structure	<i>... context, goals, analysis, design, evaluation, level of detail</i>	X		
Problem analysis		X		
Developer documentation		X		
User Documentation		X		
<p>The thesis is written in concise English without obvious grammatical errors. Its structure is logical and easy to read.</p> <p>There is considerable ambiguity about whether the multi-channel Transformer is being proposed or just evaluated. In the abstract, the author uses “The proposed architecture ...”, while in the introduction, “Fortunately, there exists a multi-channel transformer ... by Chang et al. [2020] ... We aim to evaluate this multi-channel transformer architecture.” Further, in Section 1.3, while introducing the multi-channel encoder, the author does not clearly state whether the encoder is proposed in this thesis or taken from other work.</p> <p>The developer documentation in the attachment contains brief yet concise instructions for preparing the data and running all experiments. However, the code structure is not mentioned. User documentation is not provided. However, this work is experimental.</p>				

Thesis Code

good OK poor insufficient

Design	<i>... architecture, algorithms, data structures, used technologies</i>	X		
Implementation	<i>... naming conventions, formatting, comments, testing</i>		X	
Stability			X	
<p>The student used modern toolkits such as PyTorch and PyTorch Lightning. The code has a clear structure, and various data preprocessing and training steps are separated into independent Python modules.</p> <p>The naming conventions and formatting are fine. However, only a few comments are present in the code.</p>				

Overall grade Excellent
Award level thesis No

Date 19.06.2024

Signature